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From:
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Date:
February 1, 2012

ARCADIS Project No.:
IN000473.0020

Subject:
MW-0102-S2

Sampling Results of MW-0102-S2

Vinyl Chloride (VC) and cis-1,2-dichloroethene (DCE) have periodically been detected in monitoring well MW-0102-S2. The first VC detection occurred in a sampling event conducted on May 21, 2010. Table 1 summarizes the sample dates and analytical results from the initial VC detection in May 21, 2010 through the present, and includes the sampling method utilized during each sampling event (low-flow techniques or passive diffusion bag [PDB]). The constituents identified in Table 1 are the constituents identified through the RCRA Facility Investigation process or related to the operation of the interim measures systems (i.e., tetrachloroethene (PCE) and its breakdown products). The AOI 51 Groundwater Recovery System was operational during the PDB equilibration period (04/30 – 05/21/2010) and at the time of the May 2010 sampling event. After the initial VC detection in May 2010, monitoring well MW-0102-S2 was redeveloped by a drilling subcontractor on July 16, 2010 prior to the July 17, 2010 sampling event. VC was not detected in the July 17, 2010 sample collected by low-flow. VC was also not detected in the August 9, 2010 sample collected by PDB.

Vinyl chloride was subsequently detected again during the November 2010 (PDB equilibration period from 10/15 – 11/1/2010) groundwater sampling event. Note that the AOI 51 Groundwater Recovery System was non-operational during a portion of this sampling event due to the request of USEPA for a groundwater gauging event at Allison Transmission and off-site properties. The System was restarted on October 21, 2010.

Because of the May 2010 and November 2010 detections of vinyl chloride, vertical profiling of the water column utilizing the PDB method was performed in January 2011. A total of six PDBs were deployed on January 18, 2011, at various screened intervals, as detailed in the sample names for that event (Table 1). After PDB equilibration (from 01/18 – 02/03/2011), the water samples were collected on February 3, 2011. A transducer remained in the monitoring well below the deepest PDB sampler to record groundwater elevation at one minute intervals during the equilibration of the PDB during the February 2011 sampling event. The AOI 51 Groundwater Recovery System was actively pumping during the February 2011 sampling event and the effects from the pumping activity occurring at a nearby recovery well (RW-0604-S2B) is evident in the water level at MW-0102-S2 (Attachment B). No VC or any other constituents of concern (COCs) were detected during the February 2011 sampling event.

Sampling of monitoring well MW-0102-S2 was again performed in May 2011 (PDB equilibration from 04/21 – 05/06/2011) and no VC or any other constituents of concern were detected (Table 1). The AOI 51 Groundwater Recovery System was operational during the May 2011 sampling event. Vinyl chloride and cis-1,2-dichloroethene were detected during the sampling of monitoring well MW-0102-S2 in September 2011 (Table 1). The AOI 51 Groundwater Recovery System was operational during the September 2011 sampling event. Potentiometric surface maps for the S2A and S2B units for September 2011, sampling event are presented in the Attachment A. The S2B potentiometric map shows that RW-0604-S2B and RW-0501-S2B were actively pumping during the sampling event.

Groundwater Recovery System Performance

There are two recovery wells that are in the same geologic unit and in the vicinity of MW-0102-S2: RW-0501-S2B and RW-0604-S2B. The recovery wells each have a transducer which records water level measurements at a set timed interval. Additionally, a transducer was lowered in MW-0102-S2 on July 26, 2010 to record water level measurements at a set timed interval. Graphs presenting the water above the transducer for RW-0501-S2B, RW-0604-S2B and MW-0102 are presented in Attachment B for the sampling starting in May 2010. Precipitation events, PDB deployment and PDB sampling are also marked on each graph. These graphs for all sampling events, illustrate that the water level in monitoring well MW-0102-S2 responds to the pumping from the AOI 51 Groundwater Recovery System.

Proposed Additional Investigation

Because of the sporadic but reoccurring detections of COCs in monitoring well MW-0102-S2, it is recommended that MW-0102-S2 be re-sampled at the multiple intervals as previously sampled in February 2011, however, this time baffles will be inserted between each 18" PDB to limit in-well vertical flow to assist with the conceptual understanding of any plume stratification.

A further recommended step to assist with understanding the subsurface geology in the immediate area is a soil boring and borehole water investigation. The initial proposed field effort is for a total of four soil

borings (one 60 feet east of MW-0102-S2, one 30-feet east, one 30-feet west, and one 60-feet west) to be advanced in the area of interest (Table 2 and Drawing 1). Borehole water samples will be collected from each soil boring in the upper (0-5 ft) and lower (5-10 ft) portion of the uppermost saturated zone (anticipated to be the S2 unit). Geotechnical samples will be collected for sieve analysis.

Based on the existing boring logs and cross sections, the clay unit above the saturated unit S2 appears to be discontinuous and not present at MW-0102-S2. Cross-sections for this area of Plant 12 are presented in the Attachment A for reference. During the investigation described above, the presence or absence of this overlying clay layer will be evaluated and if present, samples of the clay will be collected and analyzed for soil moisture and porosity (air-filled, water-filled and total). This data will assist in the evaluation of potential vapor intrusion risks from the groundwater.

Next Steps

Pending the results of the GeoProbe investigation, the next steps will include using the analytical data to determine the optimum location of down-gradient and/or side-gradient monitoring well(s). In the event that increasing VOC concentrations are observed when moving away from MW-0102-S2 in a given direction, then additional soil borings may be warranted to ensure that any pumping or monitoring would be performed in the area demonstrating the greatest need for remediation. Currently, it is thought that any down-gradient monitoring well(s) will be installed in the right of way in the alley to the south of the Plant 12 parking lot.

Additionally, it is recommended that a six-inch recovery well be installed in the vicinity of MW-0102-S2 and that the well be tied into the existing AOI 51 Groundwater Recovery System. The geotechnical data collected during the above recommended soil investigation will provide valuable information for proper sand pack and well screen selection for the recovery well. Currently, it is thought that the proposed recovery well will be sited in the vicinity of MW-0102-S2.

Installation of the proposed recovery well is a precautionary measure in order to be prepared to quickly recover groundwater and limit any potential contaminant migration down-gradient and off-site south of Plant 12.

A conceptual site hydrogeologic model (CSHM) will also be developed for the Plant 12 area simultaneously with the initial field effort. An accurate CSHM will help ensure that the proposed recovery well is screened in the proper zone(s), and is designed for the correct flow rate to achieve capture. The CSHM will be based on the existing site data.

Hydraulic testing will also be performed using the existing well network and transducers to determine aquifer characteristics. Specifically, the hydraulic testing will provide a better understanding of hydraulic

parameters, including horizontal and vertical hydraulic conductivity (i.e., how pumping in S3 affects S2B), and the results will assist in refining the CSHM.

Attachments:

- Table 1 – Groundwater Analytical Data for Monitoring Well, MW-0102-S2
- Table 2 – Sampling to Support Evaluation of Interim Measures System Performance
- Drawing 1 – AOI 51 (showing proposed locations for additional investigation)
- Attachment A
 - Drawing A-1 – September 2011, S2A Unit, Groundwater Potentiometric Surface Map
 - Drawing A2 – September 2011, S2A Unit, Groundwater Potentiometric Surface Map
 - Drawing A-3 – AOI 51 Cross Section Reference
 - Drawing A-4 – Cross Section 6-6' (W to E), showing VC Concentrations in Groundwater
 - Drawing A-5 – Cross Section 10-10' (N to S), showing VC Concentrations in Groundwater
 - Drawing A-6 – Cross Section 4-4' (W to E)
 - Drawing A-7 – Cross Section 5-5' (W to E)
 - Drawing A-8 – Cross Section 6-6' (W to E)
 - Drawing A-9 – Cross Section 7-7' (N to S)
 - Drawing A-10 – Cross Section 8-8' (N to S)
 - Drawing A-11 – Cross Section 9-9' (N to S)
 - Drawing A-12 – Cross Section 10-10' (N to S)
 - Drawing A-13 – Cross Section 10-10' (N to S), showing variations in boring log detail from Two adjacent borings
 - Drawing A-14 – Vermont Street Cross Section Reference
 - Drawing A-15 – Cross Section VT-1 – VT-1'
 - Drawing A-16 – Cross Section VT-2 – VT-2'
 - Drawing A-17 – Cross Section VT-3 – VT-3'
- Attachment B
 - Figure B-1 – August 2010 Transducer Data
 - Figure B-2 – November 2010 Transducer Data
 - Figure B-3 – February 2011 Transducer Data
 - Figure B-4 – May 2011 Transducer Data
 - Figure B-5 – September 2011 Transducer Data

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Table 1. Groundwater Analytical Data for Monitoring Well, MW-0102-S2, Allison Transmission, Inc., Speedway, Indiana.

AOI	Location ID	Sample Date	Sampling Method	Field Duplicate (FD)	1,1-Dichloroethene	1,2-Dibromoethane (Ethylene dibromide)	Benzene	Chloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl chloride	Xylenes (total)
					mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
AOI_51	MW-0102-S2	5/17/2001	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	
AOI_51	MW-0102-S2	11/2/2001	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	
AOI_51	MW-0102-S2	5/22/2003	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	11/20/2003	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	5/17/2004	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	11/12/2004	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	6/28/2005	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	1/11/2006	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	5/13/2008	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	10/28/2008	LF	FD	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	10/28/2008	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	4/6/2009	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	8/5/2009	LF		< 0.005 U	< 0.005 UJ	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	8/5/2009	LF	FD	< 0.005 U	< 0.005 UJ	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	5/21/2010	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	0.024	< 0.005 U	< 0.005 U	0.0436	< 0.01 U
AOI_51	MW-0102-S2	7/19/2010	LF	FD	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	0.0034 J	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	7/19/2010	LF		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	8/9/2010	PDB		< 0.005 U	< 0.005 UJ	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	11/1/2010	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	0.0027	< 0.01 U
AOI_51	MW-0102-S2(25-26')	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2(26.5-28')	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2(28-29.5)	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2(29.5-31')	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2(31-32.5')	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2(32.5-34')	2/3/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	5/6/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	< 0.002 U	< 0.01 U
AOI_51	MW-0102-S2	9/29/2011	PDB		< 0.005 U	< 0.005 U	< 0.005 U	< 0.005 U	0.148	< 0.005 U	< 0.005 U	0.0725	< 0.01 U
Drinking Water Criteria (MCL or Region 9)					0.007		0.005		0.07	0.005	0.005	0.002	10

NOTES:

LF - Low Flow Sampling Method

PDB - Passive Diffusion Bag Sampling Method

FD - Field Duplicate

mg/L- milligram per liter

U- Not detected above laboratory reporting limits

J - Estimated value

UJ - Not detected above laboratory reporting limits, value is estimated

MCL - Maximum Contaminant Levels

Table 2. Sampling to Support Evaluation of Interim Measures System Performance, Allison Transmission, Speedway, IN

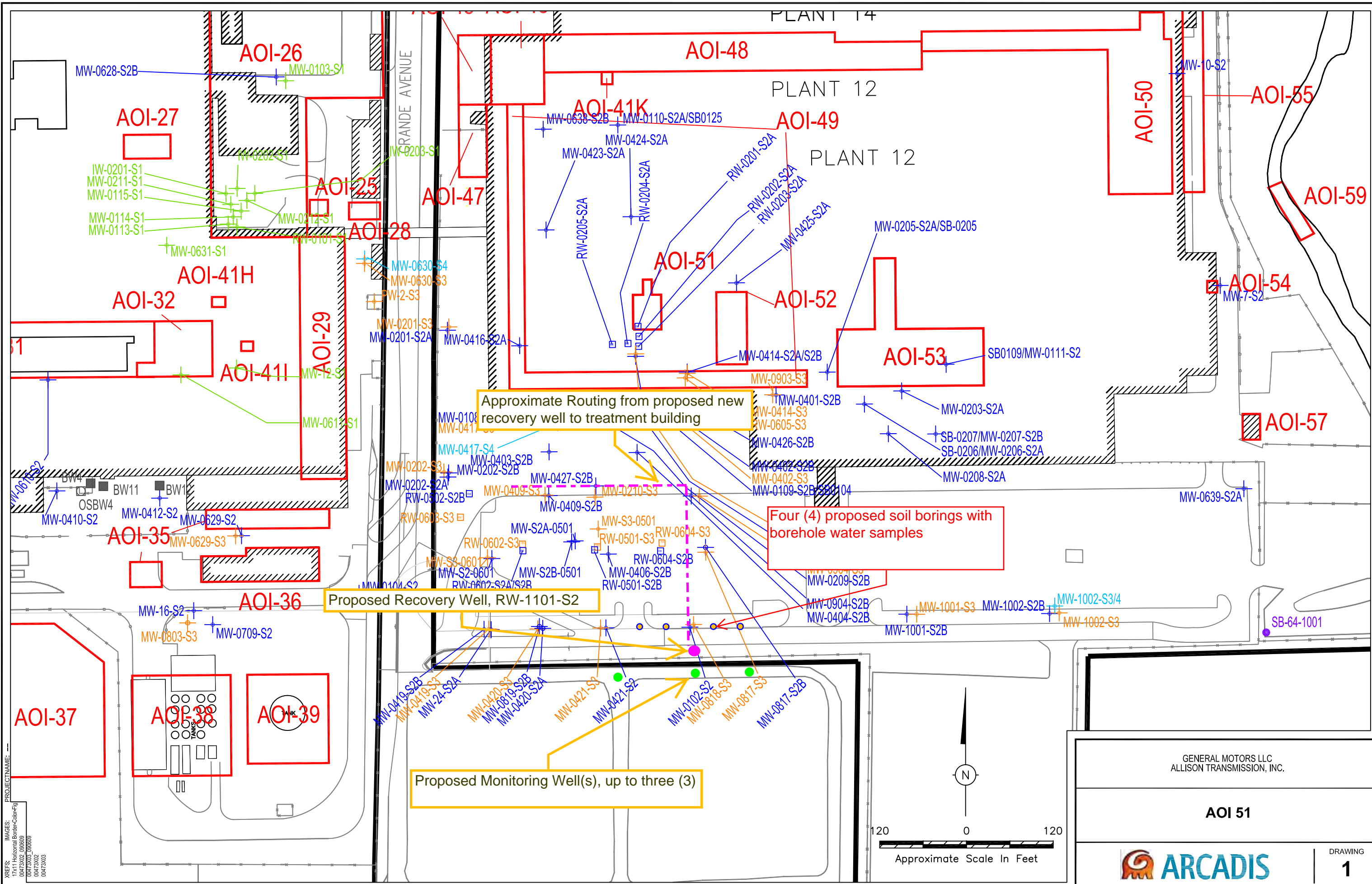
AOI	Name	Sample Matrix	Data Usage	Sample Locations	Number of Proposed Soil Borings	Number of Proposed Monitoring Wells	Laboratory Parameters	Analytical Methods (SW-846)
AOI 51	Former Degreaser Area	Borehole Water	Evaluate groundwater characteristics/ Delineate impacts in the vicinity of MW-0102-S2	One (1) soil boring 60-ft west and One (1) 30-ft west of MW-0102-S2 (SB-51-1101 and SB-51-1102) ¹ One (1) soil boring 30-ft east and One (1) soil boring 60-ft east of MW-0102-S2 (SB-51-1103 and SB-51-1104) ¹	2-4	--	VOCs	8260
		Groundwater	Provide additional groundwater quality information to evaluate system performance	Proposed monitoring well(s): monitoring well(s) south of MW-0102-S2 in alley right-of-way ²	-	1-3	VOCs	8260

Note:

¹ Collect borehole water in upper (0-5 ft) S2 unit and lower (5-10 ft) S2 unit. 24 Hour turn on analytical data.
² Sample monitoring well using the PDB sampling method (deploy PDB at typical sampling interval). Collect soil samples from saturated unit to submit for grain size analysis.

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0473X02



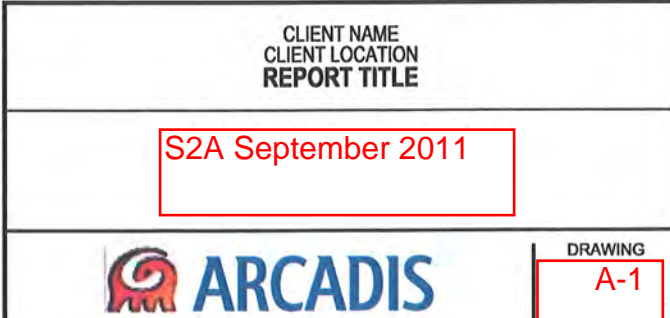
GENERAL MOTORS LLC
ALLISON TRANSMISSION, INC.

AOI 51

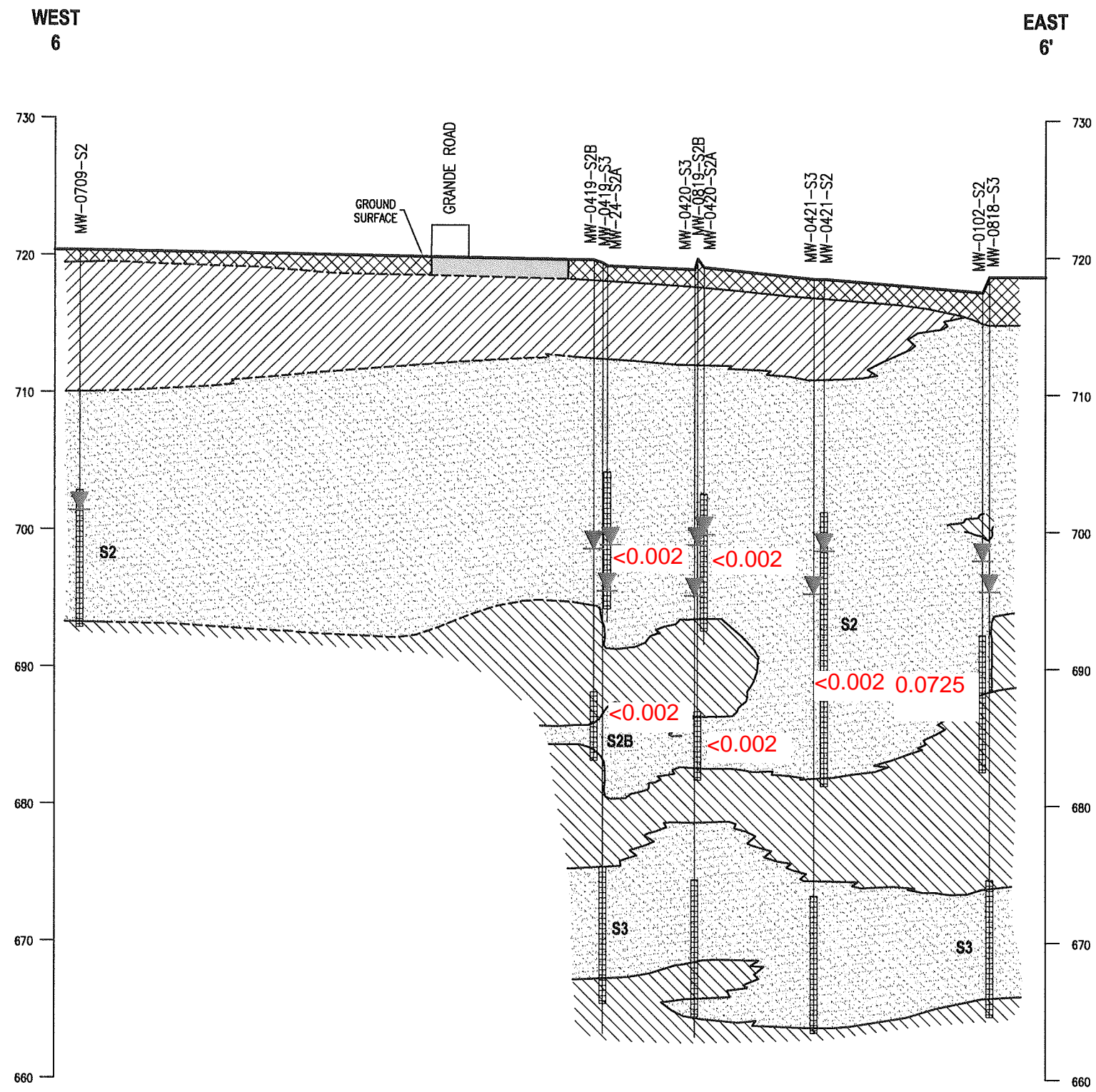


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





ATTACHMENT A



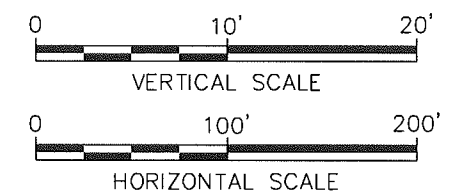




LEGEND:

- | | |
|---|-----------------------------------|
|  | ASPHALT/CONCRETE |
|  | FILL/TOPSOIL |
|  | STAINING |
|  | PLASTIC CLAY |
|  | SAND |
|  | TILL |
|  | MONITORING WELL SCREENED INTERVAL |
|  | DEPTH TO WATER DATA (APRIL 2009) |
| S2/S2A/S3 | SATURATED SAND UNIT ID |

0.0725 VC concentrations in
mg/L - September 2011



V.E. 10X

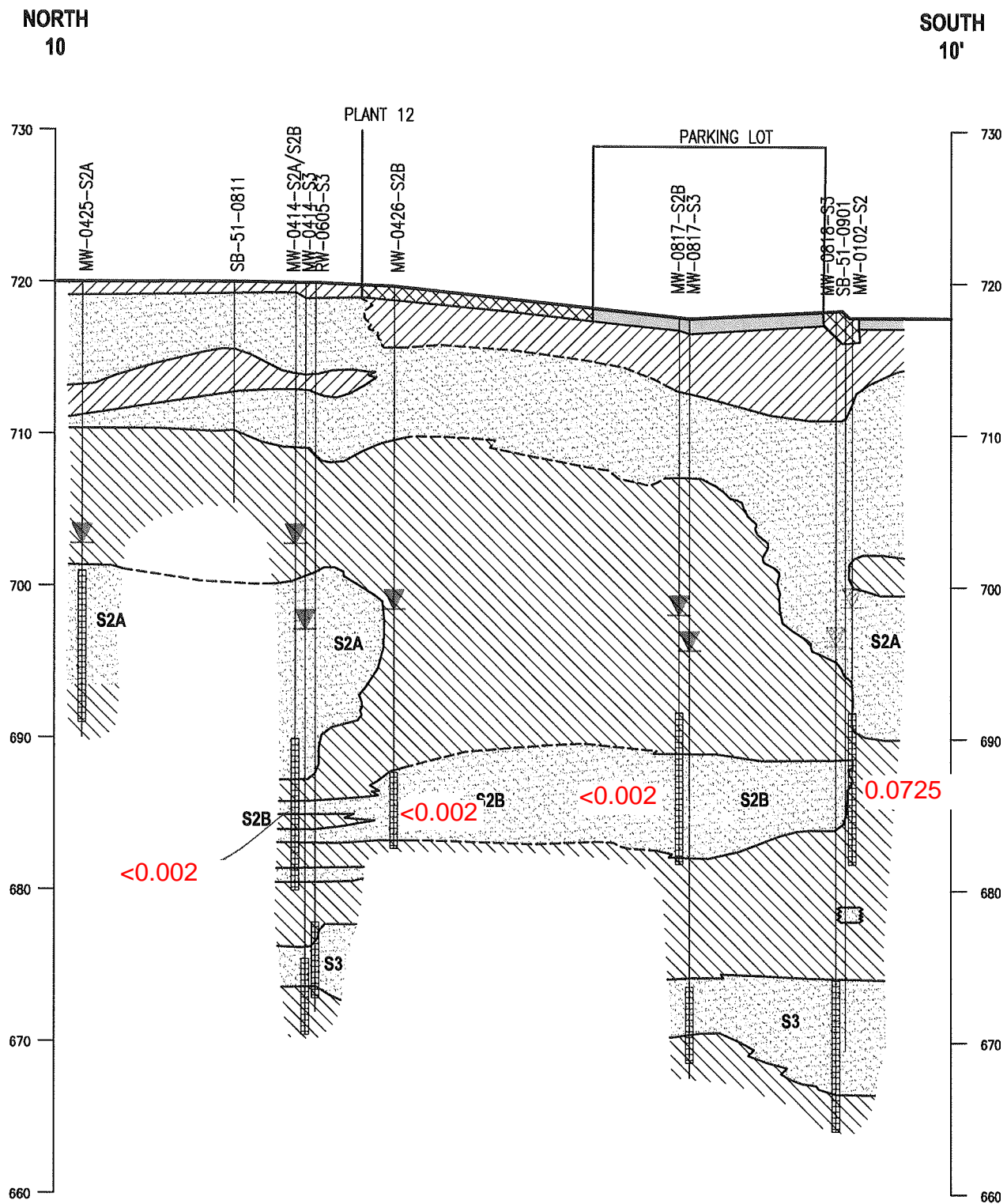
GENERAL MOTORS CORPORATION
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

CROSS SECTION 6 - 6'












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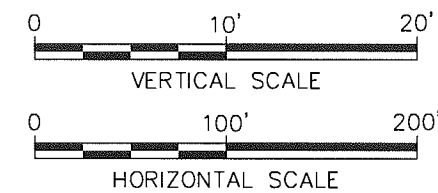
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LEGEND:

- | | |
|---|-----------------------------------|
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|  | FILL/TOPSOIL |
|  | STAINING |
|  | PLASTIC CLAY |
|  | SAND |
|  | TILL |
|  | MONITORING WELL SCREENED INTERVAL |
|  | DEPTH TO WATER DATA (APRIL 2009) |
|  | DEPTH TO WATER DATA (AUGUST 2009) |
| S2/S2A/S3 | SATURATED SAND UNIT ID |

0.0725 VC concentrations in
mg/L - September 2011



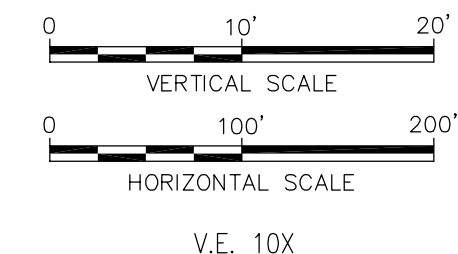
V.E. 10X

GENERAL MOTORS COMPANY
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA
AOI 51 INVESTIGATION

CROSS SECTION 10 - 10'



DRAWING
A-5



GENERAL MOTORS COMPANY
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA
AOI 51 INVESTIGATION

CROSS SECTION 4 - 4'



DRAWING

A-6



EAST
5'

- LEGEND:**

ASPHALT/CONCRETE

 FILL/TOPSOIL

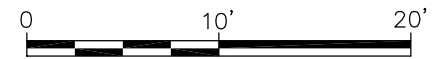
STAINING

 PLASTIC CLAY SAND TILL

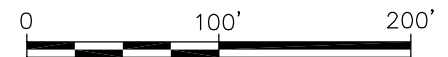
MONITORING WELL SCREENED INTERVAL

 DEPTH TO WATER DATA (APRIL 2009)

S1/S2/S2A/S3 SATURATED SAND UNIT ID



VERTICAL SCALE



HORIZONTAL SCALE

V.E. 10X

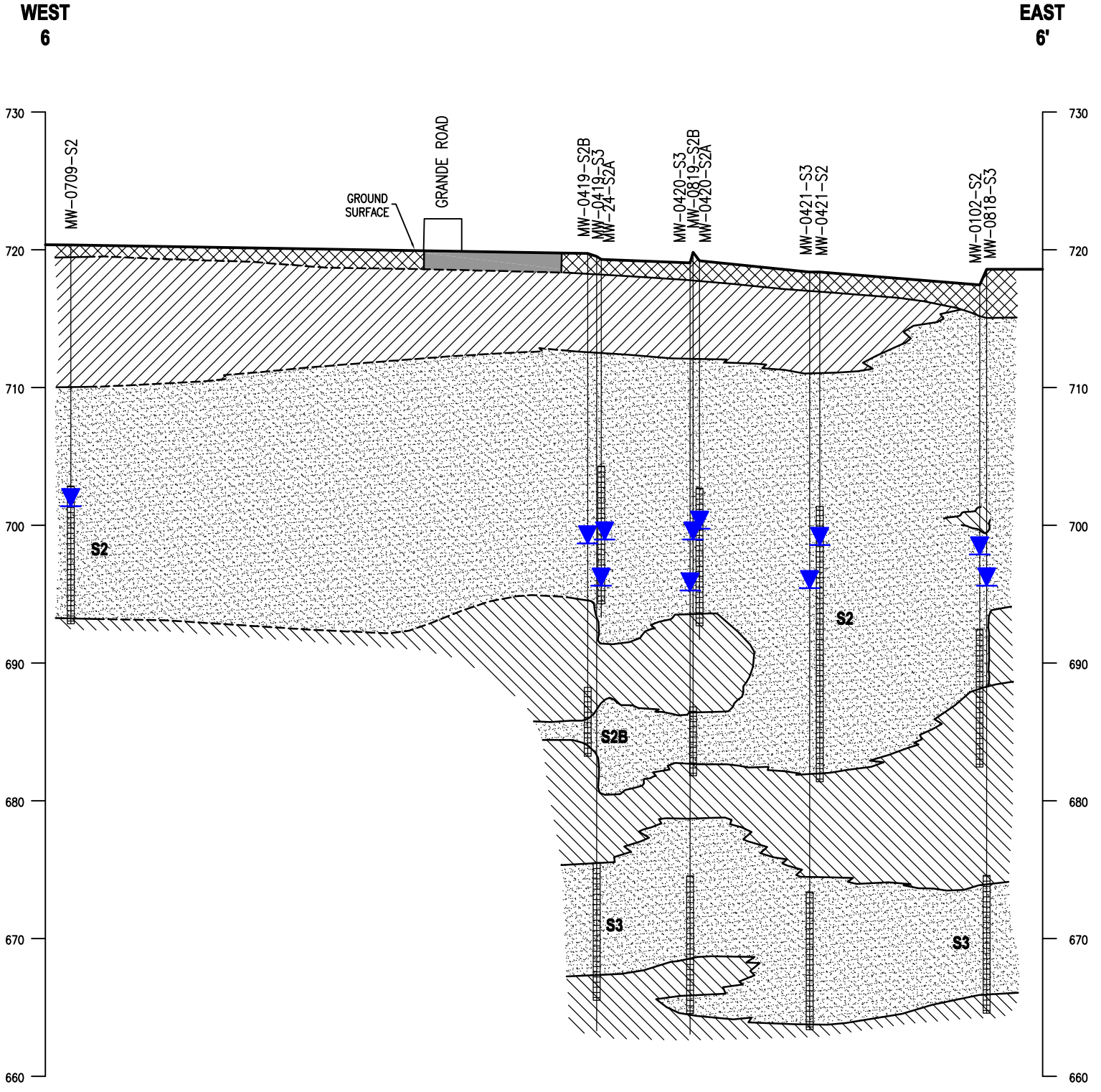
GENERAL MOTORS CORPORATION
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

CROSS SECTION 5 - 5'



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A-7



GENERAL MOTORS CORPORATION
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

CROSS SECTION 6 - 6'



DRAWING
A-8











 ASPHALT/CONCRETE
 FILL/TOPSOIL
 STAINING
 PLASTIC CLAY
 SAND
 TILL
 MONITORING WELL SCREENED INTERVAL
 DEPTH TO WATER DATA (APRIL 2009)

Diagram showing two scales:

- VERTICAL SCALE:** A horizontal bar divided into three equal segments. The first segment is black, the second is white, and the third is black. The total length is marked as 20' at the right end, with a 10' mark at the boundary between the first and second segments.
- HORIZONTAL SCALE:** A horizontal bar divided into three equal segments. The first segment is black, the second is white, and the third is black. The total length is marked as 200' at the right end, with a 100' mark at the boundary between the first and second segments.









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ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

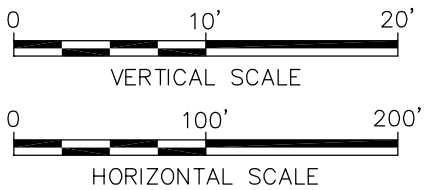


DRAWING
A-9





	ASPHALT/CONCRETE
	FILL/TOPSOIL
	STAINING
	PLASTIC CLAY
	SAND
	TILL
	MONITORING WELL SCREENED INTERVAL
	DEPTH TO WATER DATA (APRIL 2009)
2/S2A/S3	SATURATED SAND UNIT ID



CROSS SECTION 9 - 9'





PLANT 12

PARKING LOT

MW-0425-S2A

SB-51-0811

MW-0414-S2A/S2B
MW-0414-S3
RW-0605-S3

MW-0414-S2
MW-0414-S3
RW-0605-S3

MW-0426-S2B










MW-0817-S2B
MW-0817-S3

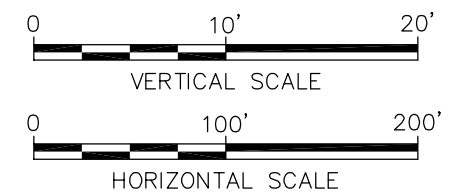
MW-0817-S2B
MW-0817-S3

~~MW-0818-S3~~
~~SB-51-0901~~
~~MW-0102-S2~~

~~MW-0818-S3~~
~~SB-51-0901~~
~~MW-0102-S2~~

LEGEND:

- | | |
|---|-----------------------------------|
|  | ASPHALT/CONCRETE |
|  | FILL/TOPSOIL |
|  | STAINING |
|  | PLASTIC CLAY |
|  | SAND |
|  | TILL |
|  | MONITORING WELL SCREENED INTERVAL |
|  | DEPTH TO WATER DATA (APRIL 2009) |
|  | DEPTH TO WATER DATA (AUGUST 2009) |
| S2/S2A/S3 | SATURATED SAND UNIT ID |



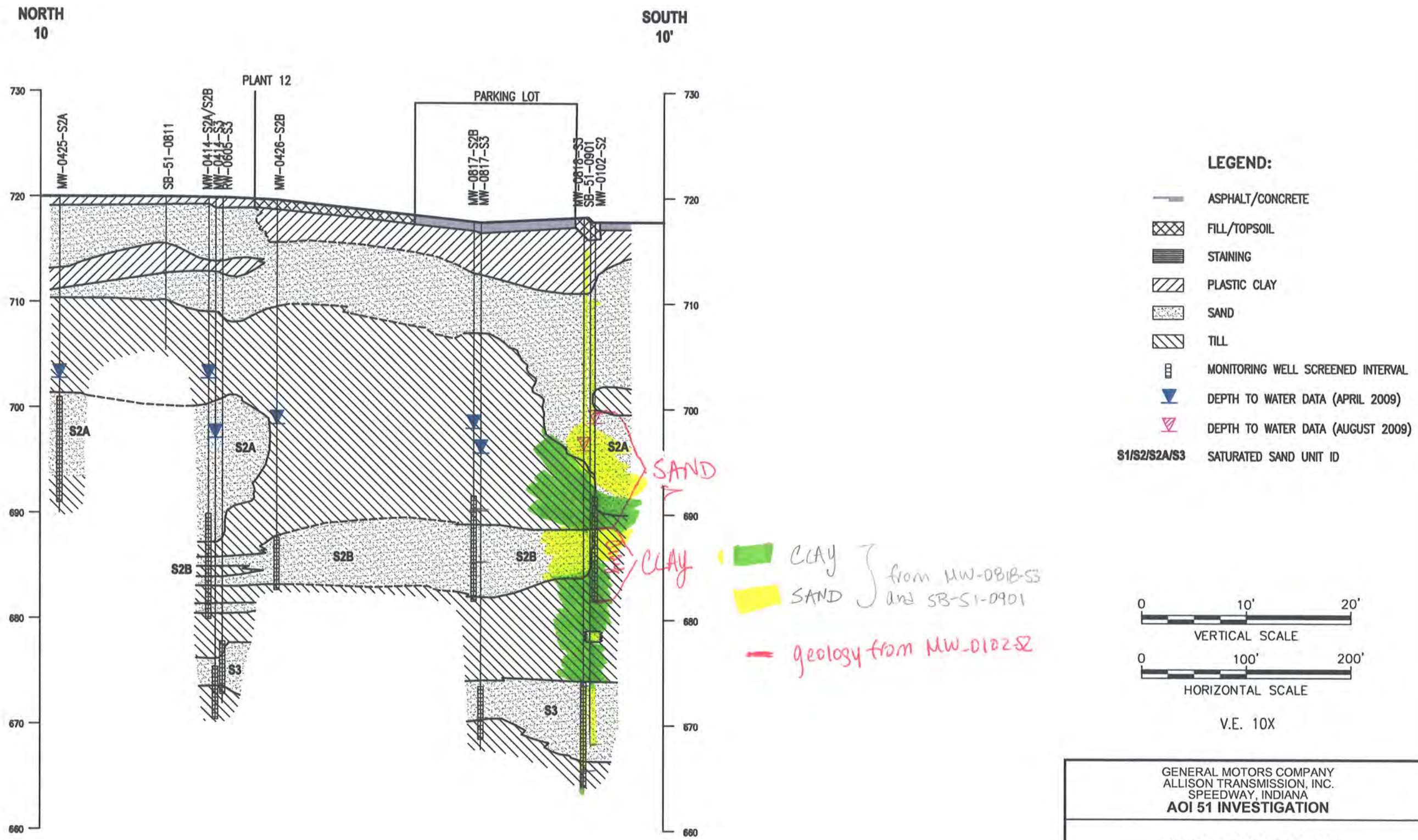
V.E. 10X

GENERAL MOTORS COMPANY
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA
AOI 51 INVESTIGATION

CROSS SECTION 10 - 10'



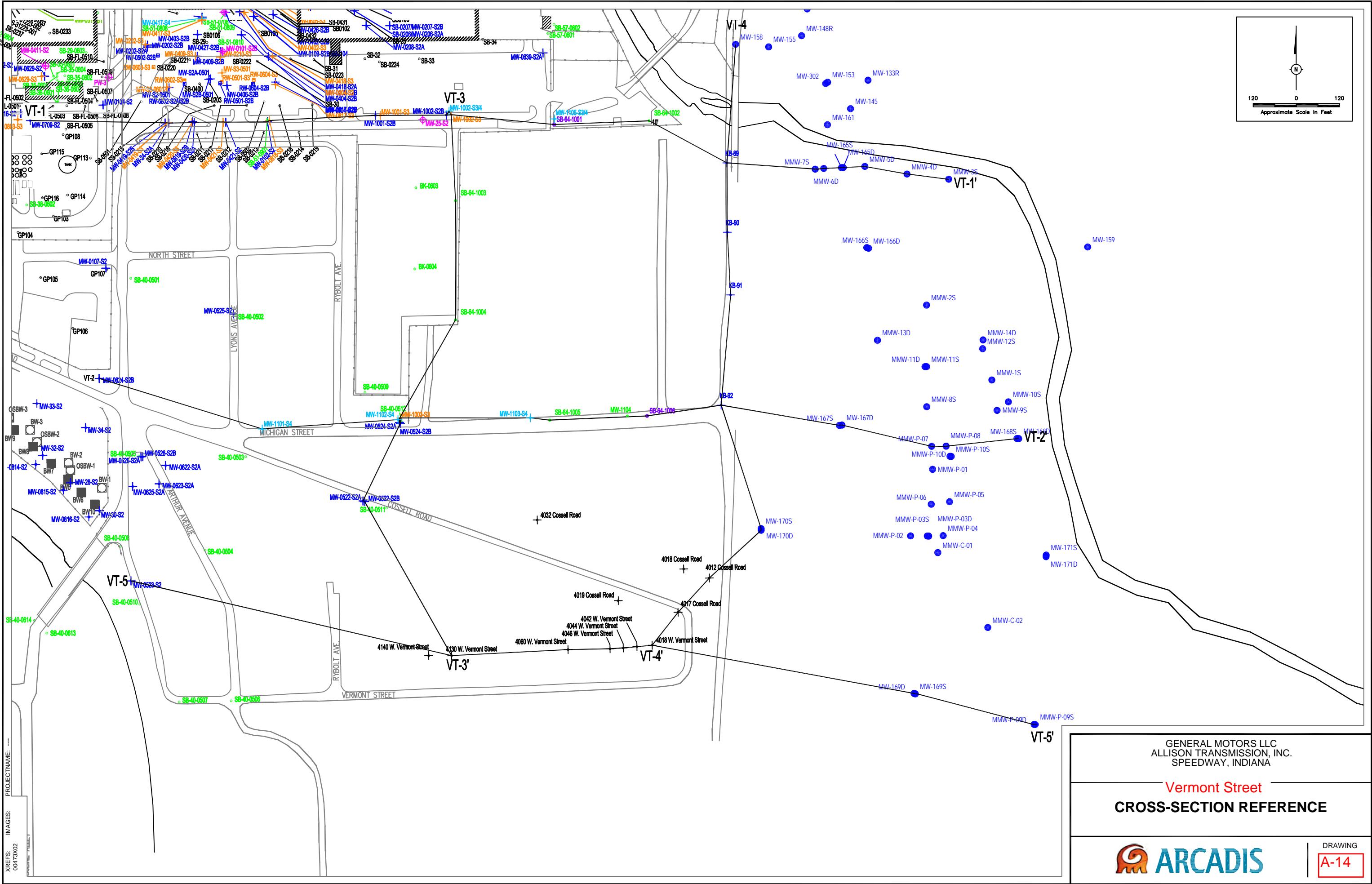
DRAWING
A-12



CROSS SECTION 10 - 10'




CITY:(Read) DIV:(GROUP:(Read) DB:(Read) LD:(Opt) PIC:(Opt) PM:(Read) TM:(Opt) LVR:(Opt)ONL="OFF"=REF" G:\PROJECT\ALLISTRI\MIN073\020-Corrective Measures\Field Investigations\Corrective Action Investigation\Vermont St. cross-reference sheet.dwg LAYOUT: 4. SAVED: 7/29/2011 2:19 PM ACADVER: 17.2S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 7/29/2011 2:29 PM BY: FISHER, SARAH

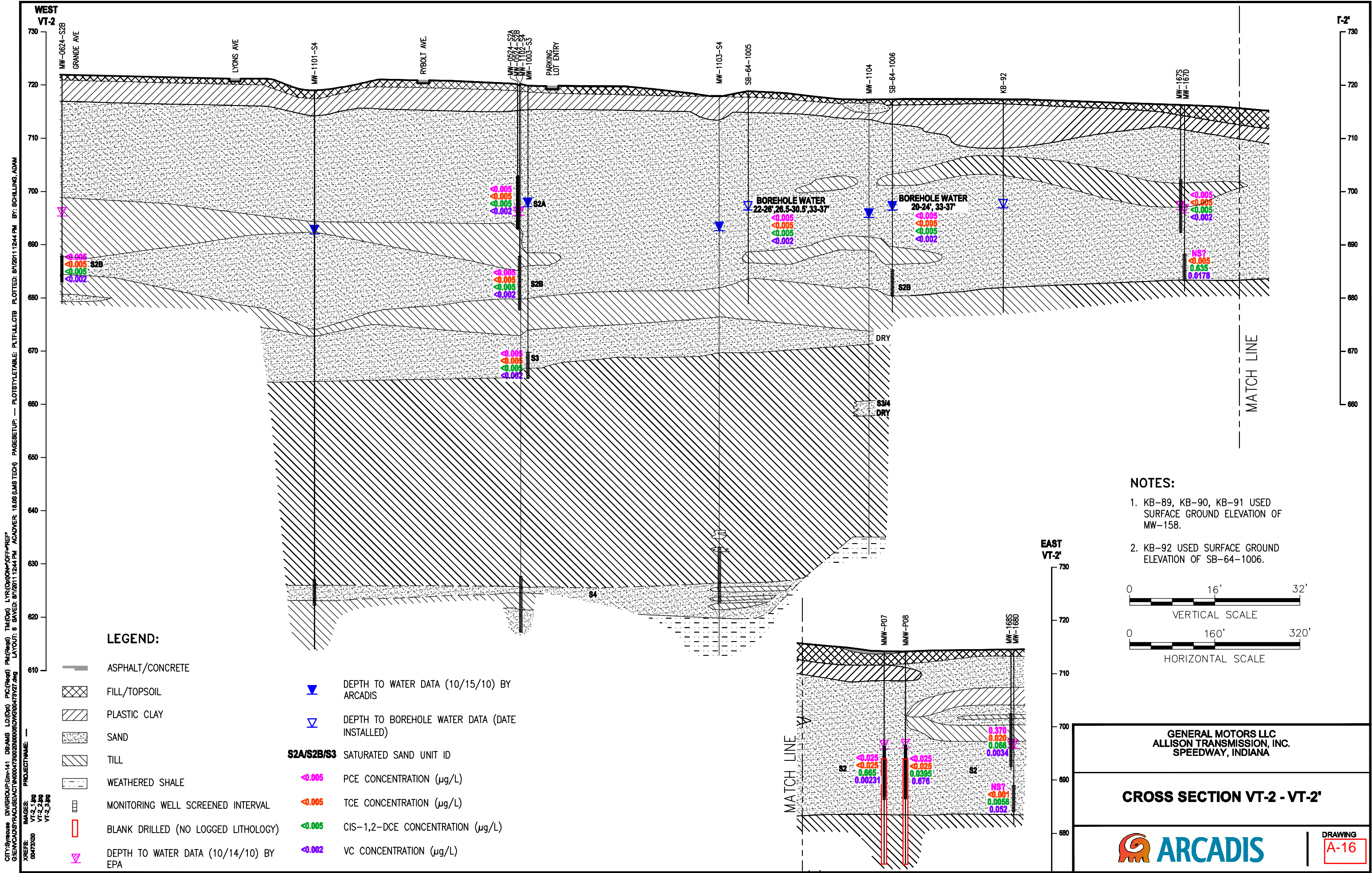


GENERAL MOTORS LLC
ALLISON TRANSMISSION, INC.
SPEEDWAY, INDIANA

Vermont Street
CROSS-SECTION REFERENCE

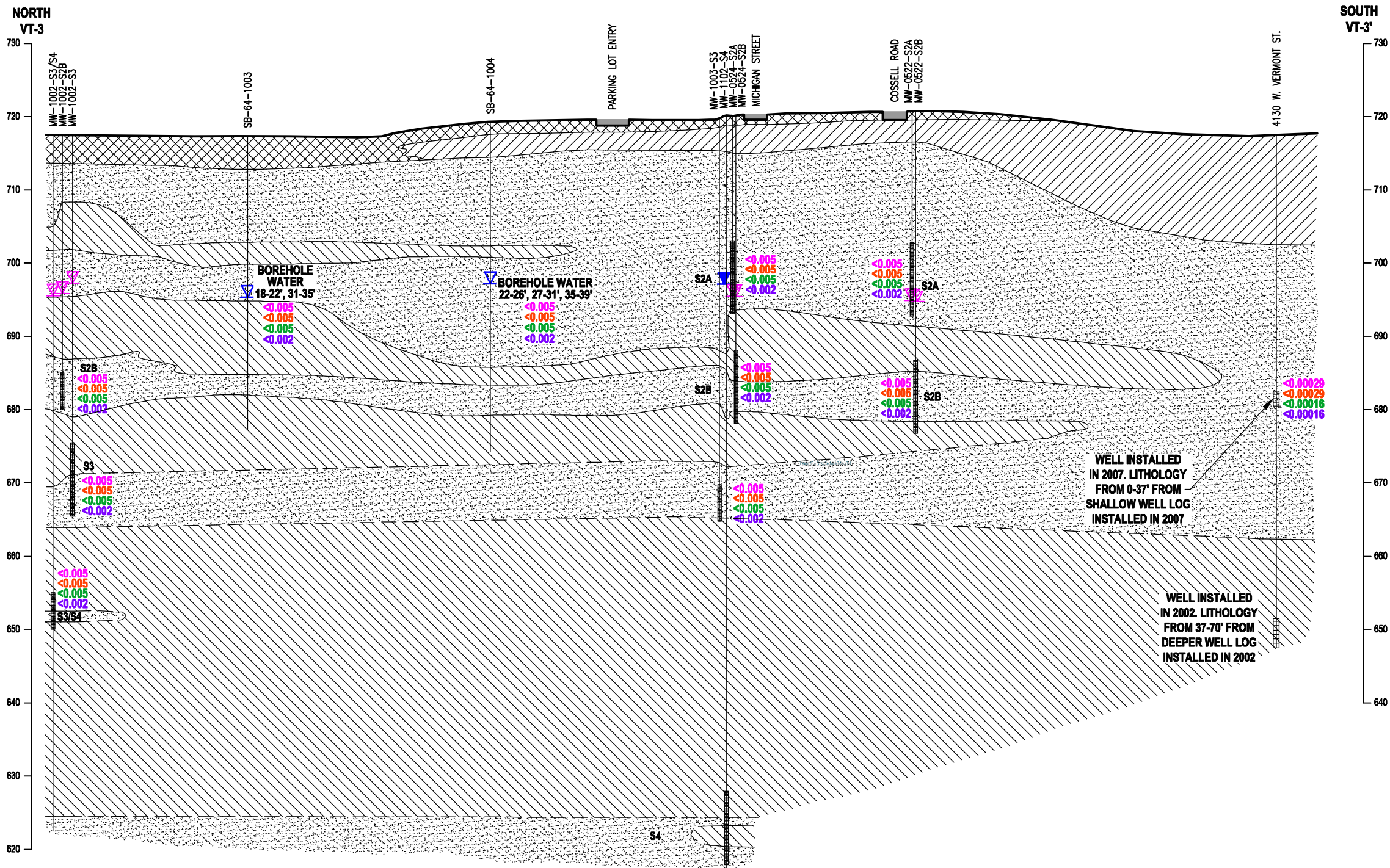


DRAWING
A-14



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XREFS: 0047300
IMAGES: VT-3.1.jpg
VT-3.2.jpg
PROJECT NAME: ---



ATTACHMENT B

August 2010, Sample Event

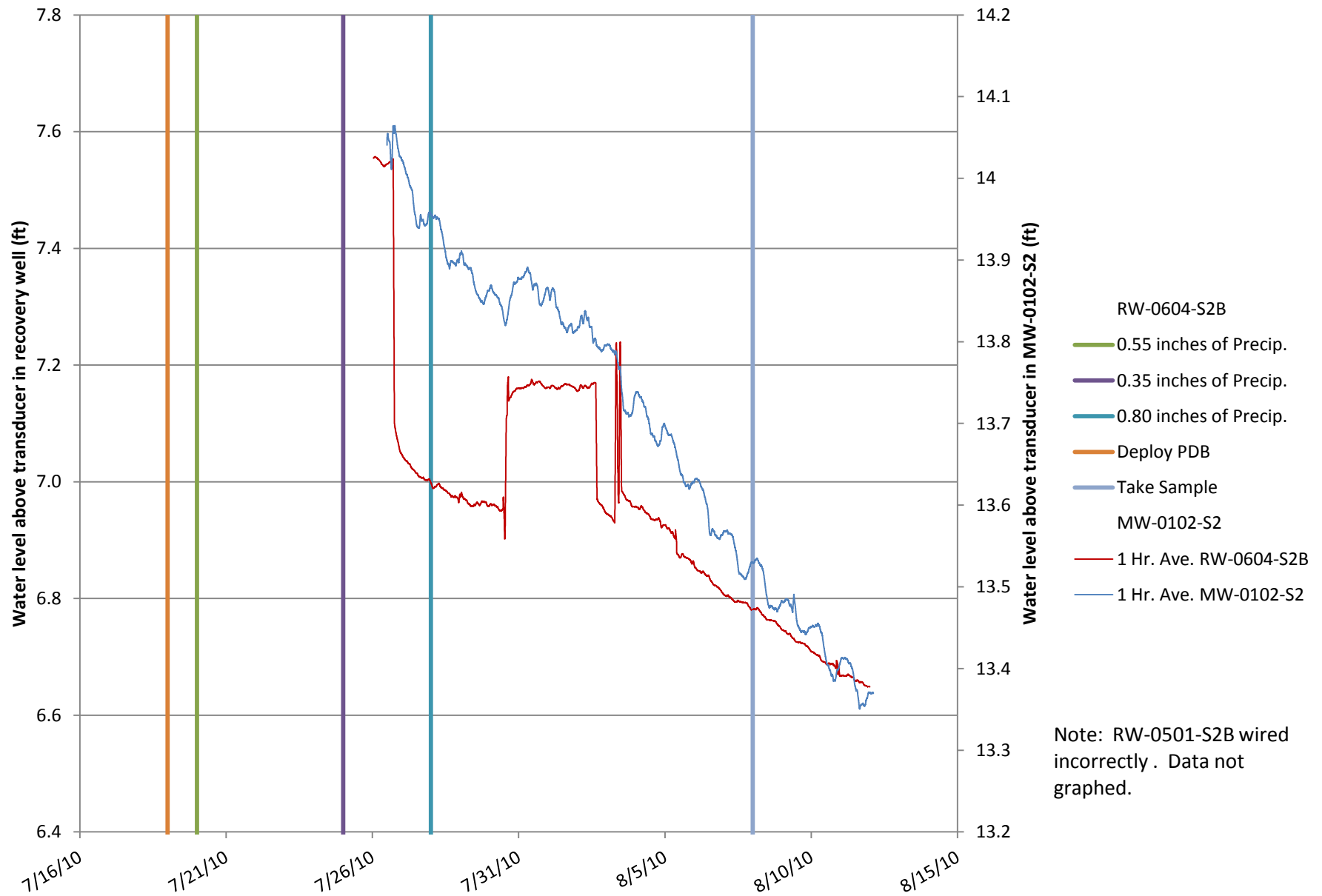


Figure B-1 - August 2010 Transducer Data

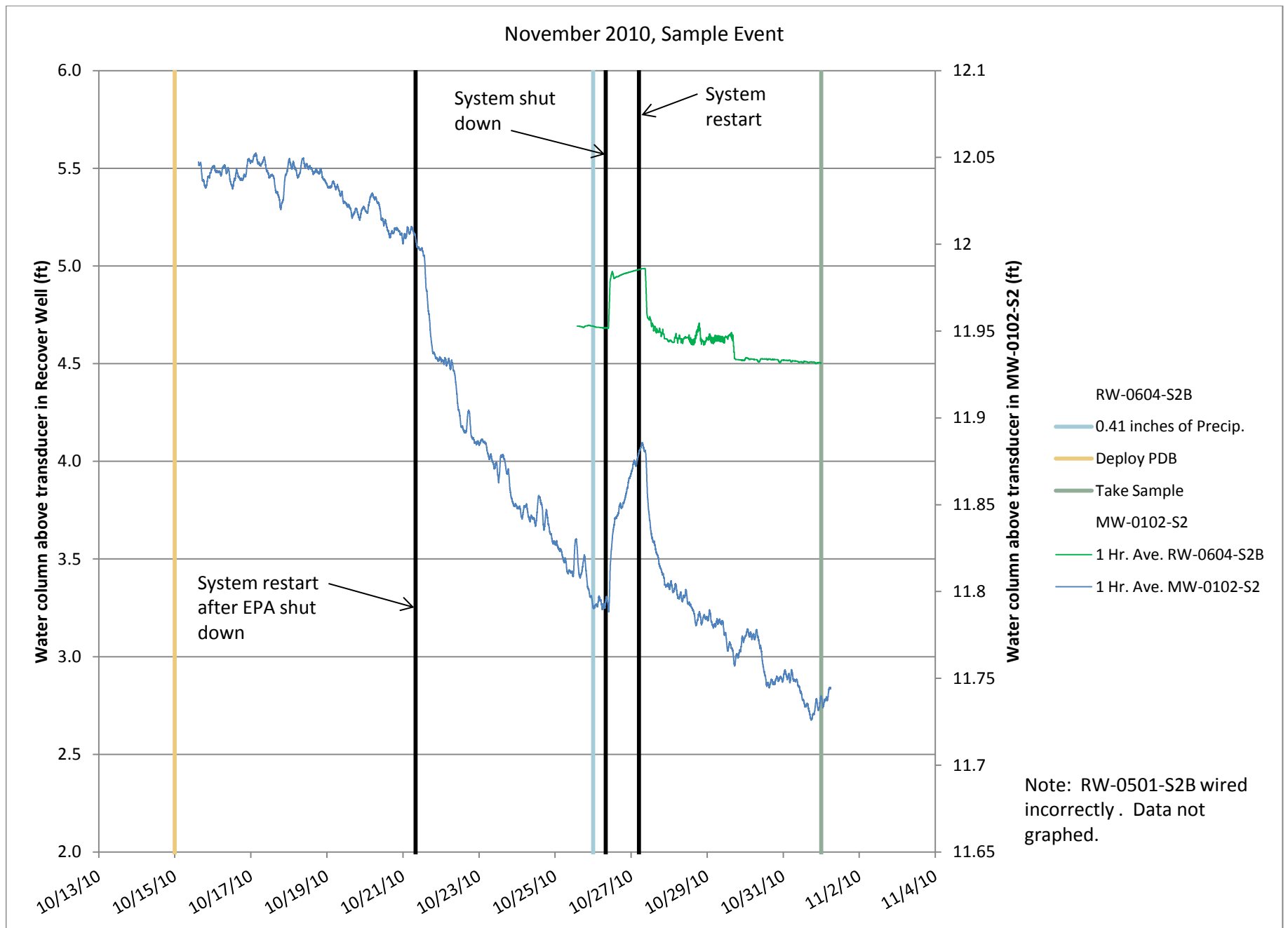


Figure B-2 - November 2010 Transducer Data

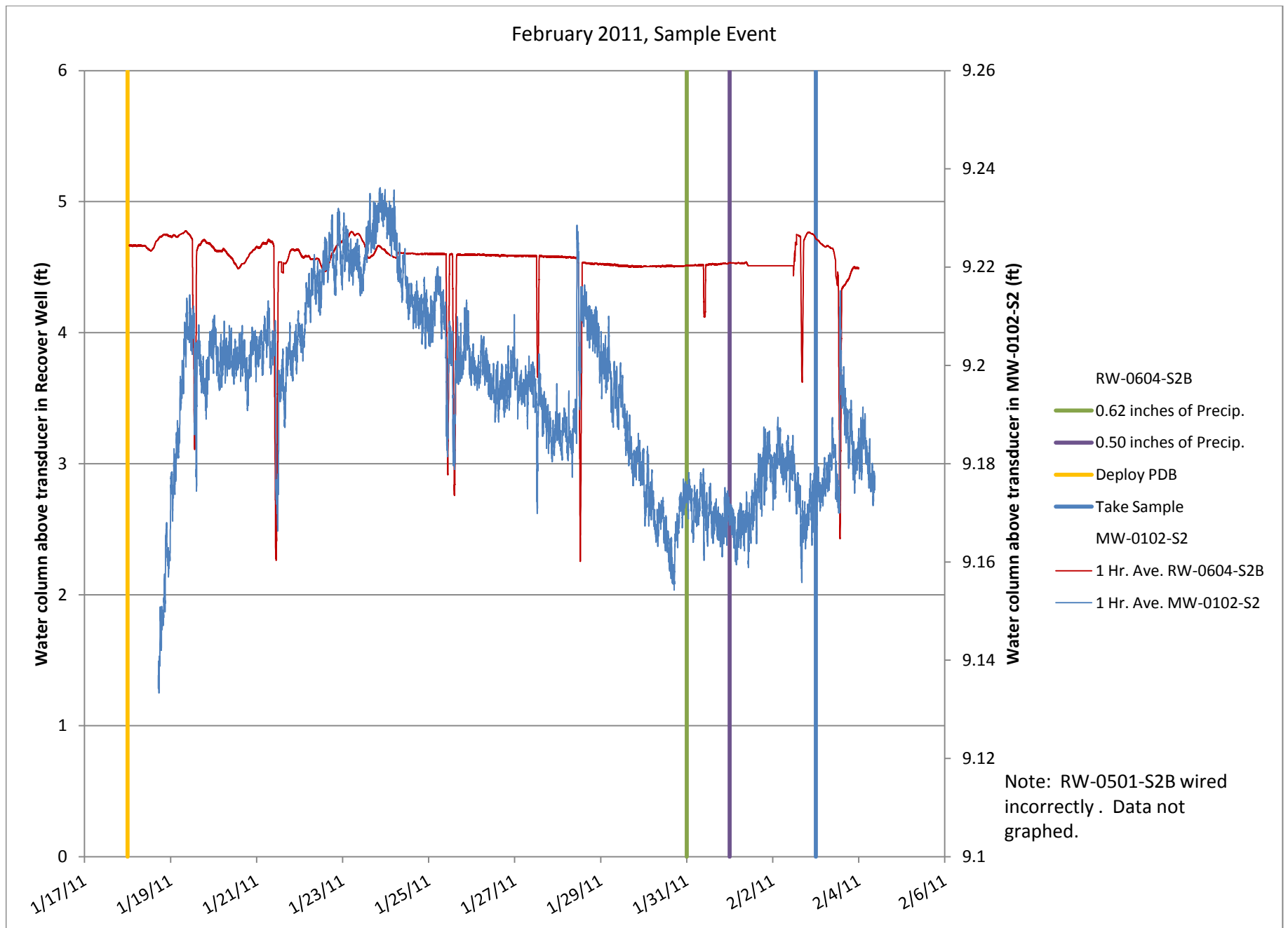


Figure B-3 - February 2011 Transducer Data

May 2011, Sample Event

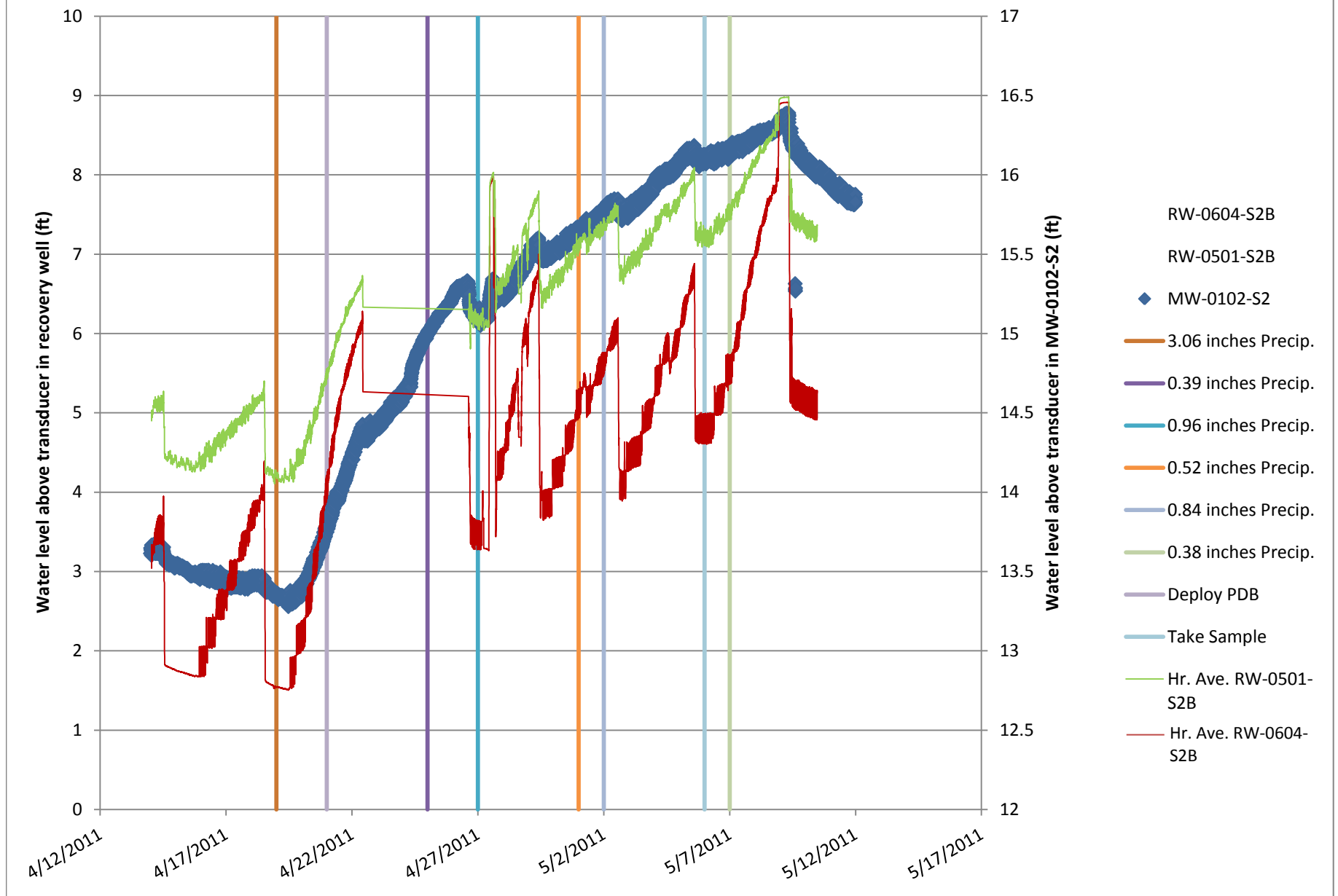


Figure B-4 - May 2011 Transducer Data

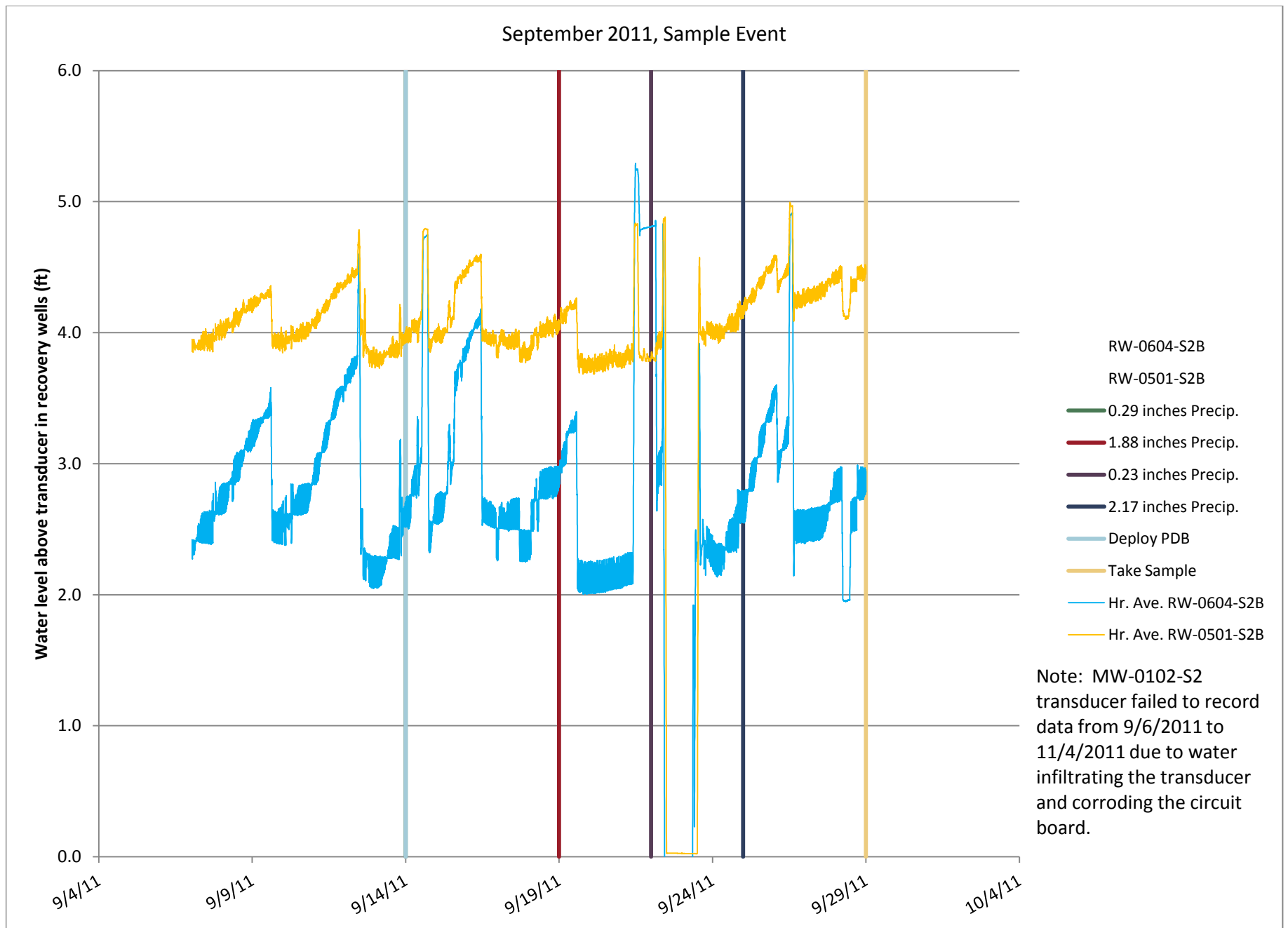


Figure B-5 - September 2011 Transducer Data